

OCR

A Level

Computer Science

H446 – Paper 1



Introduction to SQL

Unit 4
Exchanging data



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Objectives

- Be able to use SQL to retrieve data from multiple tables of a relational database
- Be able to interpret and modify SQL

SQL

- **SQL** (pronounced S-Q-L or Sequel) stands for Structured Query Language
- It is a **declarative language** used for querying and updating tables in a relational database
- It can also be used to create tables
- You can create SQL statements in a programming language such as Python to access and manipulate a database

SELECT .. FROM .. WHERE

- The SELECT statement is used to extract fields from one or more tables
- The syntax of the statement is:

SELECT *list of fields to be displayed*

FROM *list the table or tables the data will come from*

WHERE *list of search criteria*

ORDER BY *list the fields that the data is to be sorted on
(ASC or DESC, default is ASCending order)*

The SELECT statement

tblProduct

productID	productName	subject	level	price
p24	Equations	Maths	2	£12.00
p36	Programming	Comp Science	4	£5.00
p47	Database	Comp	4	£5.00

- Which products will be selected by the following SQL statement, and in what order?

```
SELECT productID, productName, subject, price
  FROM tblProduct
 WHERE level = 4
 ORDER BY productName
```

SQL Results

productID	productName	subject	level	price
p24	Equations	Maths	2	£12.00
p36	Programming	Comp Science	4	£5.00
p47	Database	Comp Science	4	£5.00

```
SELECT productID, productName, subject, price
FROM tblProduct
WHERE level = 4
ORDER BY productName
```

Results

productID	productName	subject	price
p47	Database	Comp Science	£5.00
p36	Programming	Comp Science	£5.00

ORDER BY

- You can sort the results of an SQL query in ascending or descending sequence
- To order in descending sequence, specify **DESC**
- Optionally, you can specify **ASC** (this is assumed if neither **ASC** or **DESC** is specified)

```
SELECT productID, productName, subject, price  
FROM tblProduct  
WHERE level = 4  
ORDER BY price DESC, productName ASC
```

Using a wild card

tblProduct

productID	productName	subject	level	price
p24	Equations	Maths	2	£12.00
p36	Programming	Comp Science	4	£5.00
p47	Database	Comp Science	4	£5.00
p54	Hardware	Computing	3	£6.00

- You can use a “wild card” * to mean “all” or “one or many characters”

```
SELECT *  
FROM tblProduct  
WHERE subject LIKE "Comp*"
```

- “LIKE” is used to search for a pattern

Operators in the WHERE clause

productID	productName	subject	level	price
p24	Equations	Maths	2	£12.00
p36	Programming	Comp Science	4	£5.00
p47	Database	Comp Science	4	£5.00
p54	Hardware	Computing	3	£6.00

- You can also use the following in SQL queries:

BETWEEN between an inclusive range

IN specify multiple possible values for a column

For example:

```
SELECT *  
FROM tblProduct  
WHERE price BETWEEN 5.00 AND 10.00
```

Operators in the WHERE clause

The following operators may be used in the WHERE clause

= <> > < >= <= **AND, OR, NOT**

SELECT *

FROM tblProduct

WHERE subject LIKE “Comp*” AND level = 4

Use of semicolon

- Some database systems require a semicolon at the end of each SQL statement
- A semicolon is the standard way to separate each SQL statement
- Do NOT put a semicolon at the end of each line

```
SELECT *  
FROM tblProduct  
WHERE subject LIKE "Comp*" AND level = 4
```

Note: Semicolons are not used in these SQL examples

Worksheet 4

- Try the questions in **Task 1** and the practical exercise in **Task 2** on the worksheet

Extracting data from multiple tables

- Using SQL, you can combine data from two or more tables by specifying the links between the tables
- In the RevisionSubs database created in Worksheet 2, there are three tables:

tblCustomer (custID, title, firstname, surname, email)

tblSubscription (subID, startdate, endDate, *custID*,
productID)

tblProduct (productID, productName, subject, level,
price)

- What do the italics in the definition of

Specifying links between tables

- Write SQL to show the customer ID and surname with the IDs and names of any products they subscribe to:

tblCustomer (custID, title, firstname, surname, email)

tblSubscription (subID, startdate, endDate, *custID*,
productID)

tblProduct (productID, productName, subject, level, price)

```
SELECT tblCustomer.custID, surname,  
tblProduct.productID, productName
```

```
FROM tblCustomer, tblProduct, tblSubscription
```

```
WHERE tblSubscription.custID = tblCustomer.custID  
      AND tblSubscription.productID =  
            tblProduct.productID
```

Attributes from linked tables

- When you are selecting attributes from linked tables, if the attribute name occurs in more than one table, you should specify the table name
- If the attribute name occurs in only one table, specifying the table name is optional

```
SELECT tblCustomer.custID, surname,  
tblProduct.productID, productName  
FROM tblCustomer, tblProduct, tblSubscription  
WHERE tblSubscription.custID = tblCustomer.custID  
      AND tblSubscription.productID =  
      tblProduct.productID
```

Using the JOIN keyword

- Data from two linked tables can be extracted using the JOIN keyword (an alternative to WHERE clause)
- An example of two tables linked in a one-to-many (1:M) relationship:

tblTeam(teamID, teamName, manager)

tblPlayer(playerID, surname, firstname, teamID)

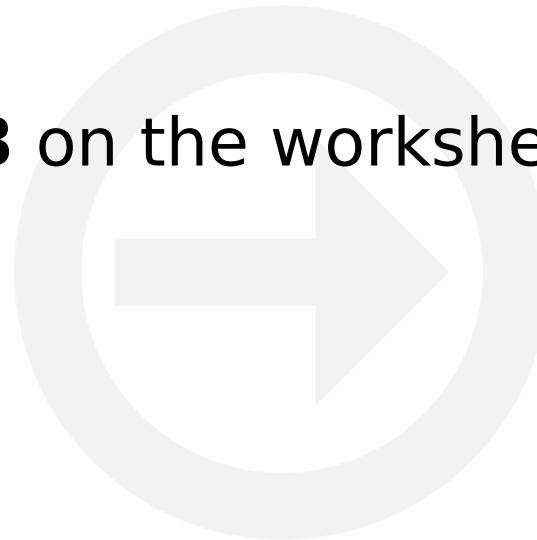
- To display all the players on Team “Binham”:

```
SELECT tblPlayer.surname, tblPlayer.firstname,  
tblTeam.teamName  
FROM tblTeam, tblPlayer
```

```
JOIN tblPlayer  
ON tblTeam.teamID = tblPlayer.teamID  
WHERE teamName = "Binham"
```

Worksheet 4

- Try the questions in **Task 3** on the worksheet



Plenary

- Memorise the main SQL keywords, clauses and formats

SELECT...

FROM ...

WHERE ...

ORDER BY ...

- Use keyword **LIKE** and wildcard ***** when appropriate
- Be familiar with the **JOIN ... ON** clause

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